

SEQUENCE LISTING

<110> NIPPON SHOKUBAI CO., LTD.

<120> Method for producing 1,3-propanediol and 3-hydroxypropionic acid

<130> PH-2376-PCT

<150> JP 2004-093417

<151> 2004-03-26

<150> JP 2004-124524

<151> 2004-04-20

<160> 75

<170> PatentIn version 3.1

<210> 1

<211> 558

<212> PRT

<213> Lactobacillus reuteri

<400> 1

Met Lys Arg Gln Lys Arg Phe Glu Glu Leu Glu Lys Arg Pro Ile His  
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Gln Asp Thr Phe Val Lys Glu Trp Pro Glu Glu Gly Phe Val Ala Met  
20 25 30

Met Gly Pro Asn Asp Pro Lys Pro Ser Val Lys Val Glu Asn Gly Lys  
35 40 45

Ile Val Glu Met Asp Gly Lys Leu Glu Asp Phe Asp Leu Ile Asp  
50 55 60

Leu Tyr Ile Ala Lys Tyr Gly Ile Asn Ile Asp Asn Val Glu Lys Val  
65 70 75 80

Met Asn Met Asp Ser Thr Lys Ile Ala Arg Met Leu Val Asp Pro Asn  
85 90 95

Val Ser Arg Asp Glu Ile Ile Glu Ile Thr Ser Ala Leu Thr Pro Ala

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105

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Lys Ala Glu Glu Ile Ile Ser Lys Leu Asp Phe Gly Glu Met Ile Met  
115 120 125

Ala Val Lys Lys Met Arg Pro Arg Arg Lys Pro Asp Asn Gln Cys His  
130 135 140

Val Thr Asn Thr Val Asp Asn Pro Val Gln Ile Ala Ala Asp Ala Ala  
145 150 155 160

Asp Ala Ala Leu Arg Gly Phe Pro Glu Gln Glu Thr Thr Ala Val  
165 170 175

Ala Arg Tyr Ala Pro Phe Asn Ala Ile Ser Ile Leu Ile Gly Ala Gln  
180 185 190

Thr Gly Arg Pro Gly Val Leu Thr Gln Cys Ser Val Glu Glu Ala Thr  
195 200 205

Glu Leu Gln Leu Gly Met Arg Gly Phe Thr Ala Tyr Ala Glu Thr Ile  
210 215 220

Ser Val Tyr Gly Thr Asp Arg Val Phe Thr Asp Gly Asp Asp Thr Pro  
225 230 235 240

Trp Ser Lys Gly Phe Leu Ala Ser Cys Tyr Ala Ser Arg Gly Leu Lys  
245 250 255

Met Arg Phe Thr Ser Gly Ala Gly Ser Glu Val Leu Met Gly Tyr Pro  
260 265 270

Glu Gly Lys Ser Met Leu Tyr Leu Glu Ala Arg Cys Ile Leu Leu Thr  
275 280 285

Lys Ala Ser Gly Val Gln Gly Leu Gln Asn Gly Ala Val Ser Cys Ile  
290 295 300

Glu Ile Pro Gly Ala Val Pro Asn Gly Ile Arg Glu Val Leu Gly Glu  
305 310 315 320

Asn Leu Leu Cys Met Met Cys Asp Ile Glu Cys Ala Ser Gly Cys Asp  
325 330 335

Gln Ala Tyr Ser His Ser Asp Met Arg Arg Thr Glu Arg Phe Ile Gly  
340 345 350

Gln Phe Ile Ala Gly Thr Asp Tyr Ile Asn Ser Gly Tyr Ser Ser Thr  
355 360 365

Pro Asn Tyr Asp Asn Thr Phe Ala Gly Ser Asn Thr Asp Ala Met Asp  
370 375 380

Tyr Asp Asp Met Tyr Val Met Glu Arg Asp Leu Gly Gln Tyr Tyr Gly  
385 390 395 400

Ile His Pro Val Lys Glu Glu Thr Ile Ile Lys Ala Arg Asn Lys Ala  
405 410 415

Ala Lys Ala Leu Gln Ala Val Phe Glu Asp Leu Gly Leu Pro Lys Ile  
420 425 430

Thr Asp Glu Glu Val Glu Ala Ala Thr Tyr Ala Asn Thr His Asp Asp  
435 440 445

Met Pro Lys Arg Asp Met Val Ala Asp Met Lys Ala Ala Gln Asp Met  
450 455 460

Met Asp Arg Gly Ile Thr Ala Ile Asp Ile Ile Lys Ala Leu Tyr Asn  
465 470 475 480

His Gly Phe Lys Asp Val Ala Glu Ala Ile Leu Asn Leu Gln Lys Gln  
485 490 495

Lys Val Val Gly Asp Tyr Leu Gln Thr Ser Ser Ile Phe Asp Lys Asp

500

505

510

Trp Asn Val Thr Ser Ala Val Asn Asp Gly Asn Asp Tyr Gln Gly Pro

515

520

525

Gly Thr Gly Tyr Arg Leu Tyr Glu Asp Lys Glu Glu Trp Asp Arg Ile

530

535

540

Lys Asp Leu Pro Phe Ala Leu Asp Pro Glu His Leu Glu Leu

545

550

555

&lt;210&gt; 2

&lt;211&gt; 1677

&lt;212&gt; DNA

&lt;213&gt; Lactobacillus reuteri

&lt;400&gt; 2

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gttaaagaat ggcagaaga aggttcgtt gcaatgtatgg ggcataatga ccctaaggct 120

agtgtaaaatgg caagatcgta gagatggatg gtaaaaagct cgaagattti 180

gatttggatg acttgtacat tgctaagttt ggaatcaata ttgacaacgt tgaaaaagtt 240

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aaccagtgta acgttaccaa tactgttcat aaccctgttc aaattgctgc tgatgctgtct 480

gatgccgttc ttctggatt tccagaacaa gaaaccacga cagctgtggc acgttatgca 540

ccattcaatg ctatccaat tttaattgggt gcacaaacag gtcgcccgttgg tgtattgaca 600

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gctgaaacca tttcagtttgc cggtaactgtatgtt cccatggta tgatactcca 720

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gacggaaatg attatcaagg accaggtact ggataccgtc tatatgaaga caaggaagaa	1620
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 <211> 558  
 <212> PRT  
 <213> *Lactobacillus reuteri*

<400> 3

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Gln Asp Thr Phe Val Lys Glu Trp Pro Glu Glu Gly Phe Val Ala Met		
20	25	30

Met Gly Pro Asn Asp Pro Lys Pro Ser Val Lys Val Glu Asn Gly Lys		
35	40	45

Ile Val Glu Met Asp Gly Lys Lys Arg Glu Asp Phe Asp Leu Ile Asp		
50	55	60

Leu Tyr Ile Ala Lys Tyr Gly Ile Asn Ile Asp Asn Val Glu Lys Val  
65 70 75 80

Met Asn Met Asp Ser Thr Lys Ile Ala Arg Met Leu Val Asp Pro Asn  
85 90 95

Val Ser Arg Glu Ser Ile Ile Glu Ile Thr Ser Ala Leu Thr Pro Ala  
100 105 110

Lys Ala Glu Glu Ile Ile Ser Lys Leu Asp Phe Gly Glu Met Ile Met  
115 120 125

Ala Ile Lys Lys Met Arg Pro Arg Arg Lys Pro Asp Asn Gln Cys His  
130 135 140

Val Thr Asn Thr Val Asp Asn Pro Val Gln Ile Ala Ala Asp Ala Ala  
145 150 155 160

Asp Ala Ala Leu Arg Gly Phe Pro Glu Gln Glu Thr Thr Ala Val  
165 170 175

Ala Arg Tyr Ala Pro Phe Asn Ala Ile Ser Ile Leu Ile Gly Ala Gln  
180 185 190

Thr Gly Arg Pro Gly Val Leu Thr Gln Cys Ser Val Glu Glu Ala Thr  
195 200 205

Glu Leu Gln Leu Gly Met Arg Gly Phe Thr Ala Tyr Ala Glu Thr Ile  
210 215 220

Ser Val Tyr Gly Thr Asp Arg Val Phe Thr Asp Gly Asp Asp Thr Pro  
225 230 235 240

Trp Ser Lys Gly Phe Leu Ala Ser Cys Tyr Ala Ser Arg Gly Leu Lys  
245 250 255

Met Arg Phe Thr Ser Gly Ala Gly Ser Glu Val Leu Met Gly Tyr Pro

260

265

270

Glu Gly Lys Ser Met Leu Tyr Leu Glu Ala Arg Cys Ile Leu Leu Thr  
275 280 285

Lys Ala Ser Gly Val Gln Gly Leu Gln Asn Gly Ala Val Ser Cys Ile  
290 295 300

Glu Ile Pro Gly Ala Val Pro Asn Gly Ile Arg Glu Val Leu Gly Glu  
305 310 315 320

Asn Leu Leu Cys Met Met Cys Asp Ile Glu Cys Ala Ser Gly Cys Asp  
325 330 335

Gln Ala Tyr Ser His Ser Asp Met Arg Arg Thr Glu Arg Phe Ile Gly  
340 345 350

Gln Phe Ile Ala Gly Thr Asp Tyr Ile Asn Ser Gly Tyr Ser Ser Thr  
355 360 365

Pro Asn Tyr Asp Asn Thr Phe Ala Gly Ser Asn Thr Asp Ala Met Asp  
370 375 380

Tyr Asp Asp Met Tyr Val Met Glu Arg Asp Leu Gly Gln Tyr Tyr Gly  
385 390 395 400

Ile His Pro Val Gln Glu Glu Thr Ile Ile Lys Ala Arg Asn Lys Ala  
405 410 415

Ala Lys Ala Leu Gln Ala Val Phe Glu Asp Leu Gly Leu Pro Lys Ile  
420 425 430

Thr Asp Glu Glu Val Glu Ala Ala Thr Tyr Ala Asn Thr His Asp Asp  
435 440 445

Met Pro Lys Arg Asp Met Val Ala Asp Met Lys Ala Ala Gln Asp Met  
450 455 460

Met Asp Arg Gly Ile Thr Ala Ile Asp Ile Ile Lys Ala Leu Tyr Asn  
465 470 475 480

His Gly Phe Lys Asp Val Ala Glu Ala Val Leu Asn Leu Gln Lys Gln  
485 490 495

Lys Val Val Gly Asp Tyr Leu Gln Thr Ser Ser Ile Phe Asp Lys Asp  
500 505 510

Trp Asn Ile Thr Ser Ala Val Asn Asp Gly Asn Asp Tyr Gln Gly Pro  
515 520 525

Gly Thr Gly Tyr Arg Leu Tyr Glu Asp Lys Glu Glu Trp Asp Arg Ile  
530 535 540

Lys Asp Leu Pro Phe Ala Leu Asp Pro Glu His Leu Glu Leu  
545 550 555

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<211> 1677  
<212> DNA  
<213> Lactobacillus reuteri

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agtgtaaagg ttgaaaacgg taaaattgtc gaaatggatg gcaagaagcg ggaagacttt 180  
gacttaattt acctctacat tgctaagtat ggaattaata ttgataacgt tgaaaaagtt 240  
atgaatatgg attcaactaa aattgcacgg atgtggttt atccaaatgt ctcacgtaa 300  
tccatcattt aaatttacttc tgcactaact ccagcgaaag ccgaagaaat cattagtaag 360  
cttgactttt gtgaaatgat tatggctatc aagaagatgc gtccgcgtcg gaagccggat 420  
aaccaatgtc acgttaccaa cacgggttgc aaccaggatc aaattgtgc tgatgtgc 480  
gatgctgcgc ttctgtggttt cccagaacaa gaaactacta ctggcggtgc cggttatgca 540  
ccattnaatg ctattnaat cttaatttgcgtt gctcaaacag gtctgtccctgg tgttattaaaca 600

caatgttctg ttgaagaagc aaccgaatttgc caattaggaa tgcgtggctt taccgcttat	660
gctgaaacta tttcagttta tggtaactgac cgggtattttat ctgtatggtga tgatacacca	720
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gtaagttgta ttgaaattcc aggtgctgtt cctaacggta tccgtgaagt tcttggtgaa	960
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attaattctg gttactcatc aactcctaaca tacgataaca cctttgtgg ttcaaaccacc	1140
gatgcaatgg actacgatga catgtatgtt atgaaacgtg acttaggtca atactatgg	1200
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acatatgcta acactcatga tgacatgcca aaacgtgaca tggttgcaga tatgaaagcc	1380
gctcaagata tcatggatcg tggcattact gctattgata ttattaaggc tctttataaac	1440
catggattta aggatgttgc tgaagctgta ttgaacccccc aaaaaggcaaaa ggttgcgtt	1500
gattacccccc aaacttcatc aatcttgc aaggattgga atatcacttc tgccgtaaat	1560
gacggaaatg actaccaagg tccaggtact ggataccgtc tatatgaaga caaggaagaa	1620
tgggatcgaa tcaaagatct tccattcgca cttgtatccag aacacttggaa actatag	1677

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 <211> 236  
 <212> PRT  
 <213> *Lactobacillus reuteri*

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Met Ala Asp Ile Asp Glu Asn Leu Leu Arg Lys Ile Val Lys Glu Val  
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Leu Ser Glu Thr Asn Gin Ile Asp Thr Lys Ile Asp Phe Asp Lys Ser

20

25

30

Asn Asp Ser Thr Ala Thr Ala Thr Gln Glu Val Gln Gln Pro Asn Ser  
35 40 45

Lys Ala Val Pro Glu Lys Lys Leu Asp Trp Phe Gln Pro Val Gly Glu  
50 55 60

Ala Lys Pro Gly Tyr Ser Lys Asp Glu Val Val Ile Ala Val Gly Pro  
65 70 75 80

Ala Phe Ala Thr Val Leu Asp Lys Thr Glu Thr Gly Ile Pro His Lys  
85 90 95

Glu Val Leu Arg Gln Val Ile Ala Gly Ile Glu Glu Glu Gly Leu Lys  
100 105 110

Ala Arg Val Val Lys Val Tyr Arg Ser Ser Asp Val Ala Phe Cys Ala  
115 120 125

Val Gln Gly Asp His Leu Ser Gly Ser Gly Ile Ala Ile Gly Ile Gln  
130 135 140

Ser Lys Gly Thr Thr Val Ile His Gln Lys Asp Gln Asp Pro Leu Gly  
145 150 155 160

Asn Leu Glu Leu Phe Pro Gln Ala Pro Val Leu Thr Pro Glu Thr Tyr  
165 170 175

Arg Ala Ile Gly Lys Asn Ala Ala Met Tyr Ala Lys Gly Glu Ser Pro  
180 185 190

Glu Pro Val Pro Ala Lys Asn Asp Gln Leu Ala Arg Ile His Tyr Gln  
195 200 205

Ala Ile Ser Ala Ile Met His Ile Arg Glu Thr His Gln Val Val Val  
210 215 220

Gly Lys Pro Glu Glu Glu Ile Lys Val Thr Phe Asp  
225 230 235

<210> 6

<211> 711

<212> DNA

<213> Lactobacillus reuteri

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ccagttggag aagcaaaacc tggatattct aaggatgaag ttgttaattgc agtcggcct	240
gcattcgc aa ctgttcttga taagacagaa actggatttc ctcataaaga agtgcttcgt	300
caagttatttgc ttgttatttgc agaagaaggc cttaaaggcgc ggttagttaa agtttaccgg	360
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aaccttgagt tattccaca agcgccagta cttactcccg aaacttatcg tgcaatttgc	540
aagaatgccg ctatgtatgc taagggtgaa tctccagaac cagttccagc taaaaacgat	600
caacttgctc gtatttacta tcaagctatt tcagcaatta tgcatattcg tgaaactcac	660
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<211> 236

<212> PRT

<213> Lactobacillus reuteri

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Met Ala Asp Ile Asp Glu Asn Leu Leu Arg Lys Ile Val Lys Glu Val			
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Leu Asn Glu Thr Asn Gln Ile Asp Thr Lys Ile Asn Phe Asp Lys Glu		
20	25	30

Asn Asn Ser Thr Ala Thr Ala Thr Glu Glu Val Gln Gln Pro Asn Ser  
35 40 45

Lys Ala Val Pro Glu Lys Lys Leu Asp Trp Phe Gln Pro Ile Gly Glu  
50 55 60

Ala Lys Pro Gly Tyr Ser Lys Asp Glu Val Val Ile Ala Val Gly Pro  
65 70 75 80

Ala Phe Ala Thr Val Leu Asp Lys Thr Glu Thr Gly Ile Pro His Lys  
85 90 95

Glu Val Leu Arg Gln Val Ile Ala Gly Ile Glu Glu Glu Gly Leu Lys  
100 105 110

Ala Arg Val Val Lys Val Tyr Arg Ser Ser Asp Val Ala Phe Cys Ala  
115 120 125

Val Gln Gly Asp His Leu Ser Gly Ser Gly Ile Ala Ile Gly Ile Gln  
130 135 140

Ser Lys Gly Thr Thr Val Ile His Gln Lys Asp Gln Asp Pro Leu Gly  
145 150 155 160

Asn Leu Glu Leu Phe Pro Gln Ala Pro Val Leu Thr Pro Glu Thr Phe  
165 170 175

Arg Ala Ile Gly Lys Asn Ala Ala Met Tyr Ala Lys Gly Glu Ser Pro  
180 185 190

Glu Pro Val Pro Ala Lys Asn Asp Gln Leu Ala Arg Ile His Tyr Gln  
195 200 205

Ala Ile Ser Ala Ile Met His Ile Arg Glu Thr His Gln Val Val Val  
210 215 220

Gly Lys Pro Glu Glu Lys Val Thr Phe Asp

225

230

235

<210> 8  
<211> 711  
<212> DNA  
<213> *Lactobacillus reuteri*

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gaagaagttc aacaacccaa cagcaaggca gttcctgaaa agaaacttga ttggttccaa 180  
ccaattggcg aagcaaaacc aggttactca aaggatgaag ttgtatcgc agttggtcct 240  
gcctttgcaa cagttctaga taaaacagaa actgggattc ctcataaaaga ggtacttcgt 300  
caagtaattg ccggaattga agaagaggga cttaaagcac gagtagttaa agtctatcgt 360  
tcatcagacg ttgctttctg tgctgttcag ggtgaccact tatctggttc aggaattgca 420  
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aacctagaat tattcccaca agctccgggtt cttacaccag aaactttccg ggcaattgg 540  
aagaatgcag caatgtacgc taaaggtgaa tctccagaac cagttccagc taagaacgat 600  
caacttgctc gtattcacta ccaagctatt tcagcaatta tgcataattcg tgaaactcac 660  
caagttgttg ttggaaagcc tgaagaagaa atcaaagtta cgttcgattta a 711

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<212> PRT  
<213> *Lactobacillus reuteri*

<400> 9

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Gly Asn Ser Ser Ser Ala Asn Ser Ser Thr Gly Thr Ser Thr Ala Ser  
20 25 30

Thr Ser Lys Glu Met Thr Ala Asp Asp Tyr Pro Leu Tyr Gln Iys His

35 40 45

Arg Asp Leu Val Lys Thr Pro Lys Gly His Asn Leu Asp Asp Ile Asn

50 55 60

Leu Gln Lys Val Val Asn Asn Gln Val Asp Pro Lys Glu Leu Arg Ile

65 70 75 80

Thr Pro Glu Ala Leu Lys Leu Gln Gly Glu Ile Ala Ala Asn Ala Gly

85 90 95

Arg Pro Ala Ile Gln Lys Asn Leu Gln Arg Ala Ala Glu Leu Thr Arg

100 105 110

Val Pro Asp Glu Arg Val Leu Glu Met Tyr Asp Ala Leu Arg Pro Phe

115 120 125

Arg Ser Thr Lys Gln Glu Leu Leu Asn Ile Ala Lys Glu Leu Arg Asp

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Lys Tyr Asp Ala Asn Val Cys Ala Ala Trp Phe Glu Glu Ala Ala Asp

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Tyr Tyr Glu Ser Arg Lys Lys Leu Lys Gly Asp Asn

165 170

<210> 10

<211> 519

<212> DNA

<213> Lactobacillus reuteri

<400> 10

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gattaccac tttatcaaaa gcaccgtat ttatcaaaa caccaaaagg acacaatctt 180

gatgacatca atttacaaaa agtagtaaat aatcaagttg atcctaagga attacggatt 240

acaccagaag cattgaaact tcaaggtaaa attgcagctt atgctggccg tccagctatt 300

caaaaagaatc ttcaacgagc tgcagaatata acacgagttac ctgacgaacg ggttcttgaat 360  
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gaattacggg acaagtatga cgctaattttt tgccgcagcat ggtttgaaga agctgctgat 480  
tattatgaaa gtcgtaagaa gctaaaggc gataactaa 519

<210> 11  
<211> 171  
<212> PRT  
<213> Lactobacillus reuteri

<400> 11

Met Ser Glu Val Asp Asp Leu Val Ala Lys Ile Met Ala Gln Met Gly  
1 5 10 15

Asn Ser Ser Ser Ser Asp Ser Ser Thr Ser Ala Thr Ser Thr Asn Asn  
20 25 30

Gly Lys Glu Met Thr Ala Asp Asp Tyr Pro Leu Tyr Gln Lys His Arg  
35 40 45

Asp Leu Val Lys Thr Pro Ser Gly Lys Lys Leu Asp Asp Ile Thr Leu  
50 55 60

Gln Lys Val Val Asn Asp Gln Val Asp Pro Lys Glu Leu Arg Ile Thr  
65 70 75 80

Pro Glu Ala Leu Lys Leu Gln Gly Glu Ile Ala Ala Asn Ala Gly Arg  
85 90 95

Pro Ala Ile Gln Lys Asn Leu Gln Arg Ala Ala Glu Leu Thr Arg Val  
100 105 110

Pro Asp Glu Arg Val Leu Gln Met Tyr Asp Ala Leu Arg Pro Phe Arg  
115 120 125

Ser Thr Lys Gln Glu Leu Leu Asp Ile Ala Asn Glu Leu Arg Asp Lys

130

135

140

Tyr His Ala Glu Val Cys Ala Ala Trp Phe Glu Glu Ala Ala Asn Tyr  
145 150 155 160

Tyr Glu Ser Arg Lys Lys Leu Lys Gly Asp Asn  
165 170

<210> 12

<211> 516

<212> DNA

<213> Lactobacillus reuteri

<400> 12

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tatcctcttt accaaaagca ccgtgattt gtaaagacac catcaggaaa gaaacttgat 180  
gatattactt tacaaaaggt tgtaaatgat caagttgatc caaaagaatt acggattact 240  
ccagaagcat taaaacttca aggtgagatc gcagcaaacg ctggtcggcc agcaattcaa 300  
aagaacttac aacgggcagc tgaattaaca cgtttccag acgaacgtgt tttgcaaatg 360  
tatgatgcat tacggccatt ccgttcaacg aagcaagaat tactagatat tgctaattgaa 420  
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tatgaaaatgc gaaagaagct caagggtgat aacttag 516

<210> 13

<211> 379

<212> PRT

<213> Lactobacillus reuteri

<400> 13

Met Gly Gly Ile Ile Pro Met Glu Lys Tyr Ser Met Pro Thr Arg Ile  
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Tyr Ser Gly Thr Asp Ser Leu Lys Glu Leu Glu Thr Leu Asn Asn Glu  
20 25 30

Arg Ile Leu Leu Val Cys Asp Ser Phe Leu Pro Gly Ser Asp Thr Leu  
35 40 45

Lys Glu Ile Glu Ser His Ile Lys Asp Asn Asn Lys Cys Glu Ile Phe  
50 55 60

Ser Asp Val Val Pro Asp Pro Pro Leu Asp Lys Ile Met Glu Gly Val  
65 70 75 80

Gln Gln Phe Leu Lys Leu Lys Pro Thr Ile Val Ile Gly Ile Gly Gly  
85 90 95

Gly Ser Ala Leu Asp Thr Gly Lys Gly Ile Arg Phe Phe Gly Glu Lys  
100 105 110

Leu Gly Lys Cys Lys Ile Asn Glu Tyr Ile Ala Ile Pro Thr Thr Ser  
115 120 125

Gly Thr Gly Ser Glu Val Thr Asn Thr Ala Val Ile Ser Asp Thr Lys  
130 135 140

Glu His Arg Lys Ile Pro Ile Leu Glu Asp Tyr Leu Thr Pro Asp Cys  
145 150 155 160

Ala Leu Leu Asp Pro Lys Leu Val Met Thr Ala Pro Lys Ser Val Thr  
165 170 175

Ala Tyr Ser Gly Met Asp Val Leu Thr His Ala Leu Glu Ser Leu Val  
180 185 190

Ala Lys Asp Ala Asn Leu Phe Thr Val Ala Leu Ser Glu Glu Ala Ile  
195 200 205

Asp Ala Val Ile Lys His Leu Val Glu Cys Tyr Arg His Gly Asp Asn  
210 215 220

Val Asp Ala Arg Lys Ile Val His Glu Ala Ser Asn Ile Ala Gly Thr

225 230 235 240

Ala Phe Asn Ile Ala Gly Leu Gly Ile Cys His Ser Ile Ala His Gln  
245 250 255

Leu Gly Ala Asn Phe His Val Pro His Gly Leu Ala Asn Thr Met Leu  
260 265 270

Leu Pro Tyr Val Ile Ala Tyr Asn Ala Glu His Ser Glu Glu Ala Leu  
275 280 285

His Lys Phe Ala Ile Ala Ala Lys Lys Ala Gly Ile Ala Ala Pro Gly  
290 295 300

Val Gly Asp Arg Leu Ala Val Lys Arg Leu Ile Ala Lys Ile Arg Glu  
305 310 315 320

Met Ala Arg Gln Met Asn Cys Pro Met Thr Leu Gln Ala Phe Gly Val  
325 330 335

Asp Pro Ala Lys Ala Glu Glu Leu Ala Asp Thr Val Val Ala Asn Ala  
340 345 350

Lys Lys Asp Ala Thr Phe Pro Gly Asn Pro Val Val Pro Ser Asp Asn  
355 360 365

Asp Leu Lys Met Val Tyr Glu Ala Ile Ile Arg  
370 375

<210> 14  
<211> 1140  
<212> DNA  
<213> Lactobacillus reuteri

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gatactggta	agggattcg	tttcttggt	gaaaagtgg	gcaagtcaa	gatcaatgaa	360
tatattgcta	ttccaacaac	gagtggta	ggttcagaag	ttacgatac	tgcggttatt	420
tctgatacga	aagaacatcg	taaaattcct	attttggaag	attattgac	acctgattgt	480
gctttactag	atcctaaact	agttatgact	gctcctaaga	gtgtaactgc	atattcagga	540
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gctgaagaat	tagctgatac	tgttgttgca	aatgcgaaga	aagatgcaac	attccctggc	1080
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<210> 15

<211> 379

<212> PRT

<213> *Lactobacillus reuteri*

<400> 15

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20															30

Arg Ile Leu Leu Val Cys Asp Ser Phe Leu Pro Gly Ser Asp Thr Leu

35

40

45

Lys Glu Ile Glu Ser His Ile Asn Asp Ser Asn Lys Cys Glu Ile Phe  
50 55 60

Ser Asp Val Val Pro Asp Pro Pro Leu Asp Lys Ile Met Glu Gly Val  
65 70 75 80

Gln Gln Phe Leu Lys Leu Lys Pro Thr Ile Val Ile Gly Ile Gly Gly  
85 90 95

Gly Ser Ala Met Asp Thr Gly Lys Gly Ile Arg Phe Phe Gly Glu Lys  
100 105 110

Leu Gly Lys Cys Lys Ile Asn Glu Tyr Ile Ala Ile Pro Thr Thr Ser  
115 120 125

Gly Thr Gly Ser Glu Val Thr Asn Thr Ala Val Ile Ser Asp Thr Lys  
130 135 140

Glu His Arg Lys Ile Pro Ile Leu Glu Asp Tyr Leu Thr Pro Asp Cys  
145 150 155 160

Ala Leu Leu Asp Pro Lys Leu Val Met Thr Ala Pro Lys Ser Val Thr  
165 170 175

Ala Tyr Ser Gly Met Asp Val Leu Thr His Ala Leu Glu Ser Leu Val  
180 185 190

Ala Lys Asp Ala Asn Leu Phe Thr Val Ala Leu Ser Glu Glu Ala Ile  
195 200 205

Asp Ala Val Thr Lys Tyr Leu Val Glu Cys Tyr Arg His Gly Asp Asn  
210 215 220

Val Asp Ala Arg Lys Ile Val His Glu Ala Ser Asn Ile Ala Gly Thr  
225 230 235 240

Ala Phe Asn Ile Ala Gly Leu Gly Ile Cys His Ser Ile Ala His Gln  
245 250 255

Leu Gly Ala Asn Phe His Val Pro His Gly Leu Ala Asn Thr Met Leu  
260 265 270

Leu Pro Tyr Val Val Ala Tyr Asn Ala Glu His Cys Glu Glu Ala Leu  
275 280 285

His Lys Phe Ala Ile Ala Ala Lys Lys Ala Gly Ile Ala Ala Pro Gly  
290 295 300

Val Gly Asp Arg Leu Ala Val Lys Arg Leu Ile Ala Lys Ile Arg Glu  
305 310 315 320

Met Ala Arg Gln Met Asn Cys Pro Met Thr Leu Gln Ala Phe Gly Val  
325 330 335

Asp His Ala Lys Ala Glu Ala Ala Asp Thr Val Val Ala Asn Ala  
340 345 350

Lys Lys Asp Ala Thr Phe Pro Gly Asn Pro Val Val Pro Ser Asp Asp  
355 360 365

Asp Leu Lys Met Ile Tyr Glu Ala Ile Ile Arg  
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<210> 16  
<211> 1140  
<212> DNA  
<213> Lactobacillus reuteri

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<210> 17

<211> 390

<212> PRT

<213> *Lactobacillus reuteri*

<400> 17

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Pro	Gly	Val	Ile	Ala	Lys	Ile	Gly	Asp	Arg	Ala	Lys	Met	Leu	Asn	Met
		20				25						30			

His	Lys	Pro	Leu	Ile	Val	Thr	Thr	Glu	Gly	Leu	Ser	Lys	Ile	Asp	Asn
		35				40						45			

Gly Pro Val Lys Gln Thr Val Ala Ser Leu Glu Lys Ala Gly Val Asp  
50 55 60

Tyr Ala Val Phe Thr Gly Ala Glu Pro Asn Pro Lys Ile Arg Asn Val  
65 70 75 80

Gln Ala Gly Lys Lys Met Tyr Gln Asp Glu Asn Cys Asp Ser Ile Ile  
85 90 95

Thr Val Gly Gly Ser Ala His Asp Cys Gly Lys Gly Ile Gly Ile  
100 105 110

Val Leu Thr Asn Gly Asp Asp Ile Ser Lys Leu Ala Gly Ile Glu Thr  
115 120 125

Leu Lys Asn Pro Leu Pro Pro Leu Met Ala Val Asn Thr Thr Ala Gly  
130 135 140

Thr Gly Ser Glu Leu Thr Arg His Ala Val Ile Thr Asn Glu Lys Thr  
145 150 155 160

His Leu Lys Phe Val Val Val Ser Trp Arg Asn Ile Pro Leu Val Ser  
165 170 175

Phe Asn Asp Pro Met Leu Met Leu Asp Ile Pro Lys Asp Ile Thr Ala  
180 185 190

Ala Thr Gly Cys Asp Ala Phe Val Gln Ala Ile Glu Pro Tyr Val Ser  
195 200 205

Val Asp His Asn Pro Ile Thr Asp Ser Gln Cys Lys Glu Ala Ile Gln  
210 215 220

Leu Ile Gln Thr Ala Leu Pro Glu Val Val Ala Asn Gly His Asn Ile  
225 230 235 240

Glu Ala Arg Thr Lys Met Val Glu Ala Glu Met Leu Ala Gly Met Ala

245

250

255

Phe Asn Asn Ala Asn Leu Gly Tyr Val His Ala Met Ala His Gln Leu  
260 265 270

Gly Gly Gln Tyr Asp Ala Pro His Gly Val Cys Cys Ala Leu Leu Leu  
275 280 285

Thr Thr Val Glu Glu Tyr Asn Leu Ile Ala Cys Pro Glu Arg Phe Ala  
290 295 300

Glu Leu Ala Lys Val Met Gly Phe Asp Thr Thr Gly Leu Thr Leu Tyr  
305 310 315 320

Glu Ala Ala Gln Lys Ser Ile Asp Gly Met Arg Glu Met Cys Arg Leu  
325 330 335

Val Gly Ile Pro Ser Ser Ile Lys Glu Ile Gly Ala Lys Pro Glu Asp  
340 345 350

Phe Glu Met Met Ala Lys Asn Ala Leu Lys Asp Gly Asn Ala Phe Ser  
355 360 365

Asn Pro Arg Lys Gly Thr Val Glu Asp Ile Val Lys Leu Tyr Gln Lys  
370 375 380

Ala Tyr Asp Gly Ile Tyr  
385 390

<210> 18

<211> 1173

<212> DNA

<213> Lactobacillus reuteri

<400> 18

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gaaggtttat ccaagattga caatggcct gtaaagcaaa ccgttgcttc attggaaaag 180

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<210> 19

<211> 616

<212> PRT

<213> Lactobacillus reuteri

<400> 19

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20					25						30				

Asn Ser Gly Ile Ala Pro Thr Thr Gly Ile Lys Gly Thr Lys Gln Asn  
35 40 45

Leu Val Gly Ile Arg Asp Ser Ile Thr Gln Val Leu Asn Lys Ser Asn  
50 55 60

Leu Thr Ile Asp Asp Ile Asp Leu Ile Arg Ile Asn Glu Ala Thr Pro  
65 70 75 80

Val Ile Gly Asp Val Ala Met Glu Thr Ile Thr Glu Thr Val Val Thr  
85 90 95

Glu Ser Thr Met Ile Gly His Asn Pro Asn Thr Pro Gly Gly Ile Gly  
100 105 110

Thr Gly Ala Gly Ile Thr Val Arg Leu Leu Asp Leu Leu Lys Lys Thr  
115 120 125

Asp Lys Ser Lys Asn Tyr Ile Val Val Val Pro Lys Asp Ile Asp Phe  
130 135 140

Glu Asp Val Ala Lys Leu Ile Asn Ala Tyr Val Ala Ser Gly Tyr Lys  
145 150 155 160

Ile Thr Ala Ala Ile Leu Arg Asn Asp Asp Gly Val Leu Val Asp Asn  
165 170 175

Arg Leu Asn His Lys Ile Pro Ile Val Asp Glu Val Ala Met Ile Asp  
180 185 190

Lys Val Pro Leu Asn Met Leu Ala Ala Val Glu Val Ala Gly Pro Gly  
195 200 205

Gln Val Ile Ser Gln Leu Ser Asn Pro Tyr Gly Ile Ala Thr Leu Phe  
210 215 220

Gly Leu Thr Pro Glu Glu Thr Lys Asn Ile Val Pro Val Ser Arg Ala

225

230

235

240

Leu Ile Gly Asn Arg Ser Ala Val Val Ile Lys Thr Pro Ala Gly Asp  
245 250 255

Val Lys Ala Arg Val Ile Pro Ala Gly Lys Ile Ile Ile Asn Gly Asp  
260 265 270

Thr Gly Lys Glu Glu Val Gly Val Ser Glu Gly Ala Asp Ala Ile Met  
275 280 285

Lys Lys Val Ser Ser Phe Arg His Ile Asn Asn Ile Thr Gly Glu Ser  
290 295 300

Gly Thr Asn Val Gly Gly Met Leu Glu Asn Val Arg Gln Thr Met Ala  
305 310 315 320

Asp Leu Thr Gly Lys Asn Asp Glu Ile Ala Ile Gln Asp Leu Leu  
325 330 335

Ala Val Asp Thr Gln Val Pro Val Glu Val Arg Gly Gly Leu Ala Gly  
340 345 350

Glu Phe Ser Asn Glu Ser Ala Val Gly Ile Ala Ala Met Val Lys Ser  
355 360 365

Asp His Leu Gln Met Glu Val Ile Ala Lys Leu Ile Glu Lys Glu Phe  
370 375 380

Asn Thr Lys Val Glu Ile Gly Gly Ala Glu Val Glu Ser Ala Ile Arg  
385 390 395 400

Gly Ala Leu Thr Thr Pro Gly Thr Asp Lys Pro Ile Ala Ile Leu Asp  
405 410 415

Leu Gly Ala Gly Ser Thr Asp Ala Ser Ile Ile Asn Lys Glu Asn Asn  
420 425 430

Thr Val Ala Ile His Leu Ala Gly Ala Gly Asp Met Val Thr Met Ile  
435 440 445

Ile Asn Ser Glu Leu Gly Leu Asn Asp Ile His Leu Ala Glu Asp Ile  
450 455 460

Lys Arg Tyr Pro Leu Ala Lys Val Glu Asn Leu Phe Gln Ile Arg His  
465 470 475 480

Glu Asp Gly Ser Val Gln Phe Phe Lys Asp Pro Leu Pro Ser Ser Leu  
485 490 495

Phe Ala Lys Val Val Val Ile Lys Pro Asp Gly Tyr Glu Pro Val Thr  
500 505 510

Gly Asn Pro Ser Ile Glu Lys Ile Lys Leu Val Arg Gln Ser Ala Lys  
515 520 525

Lys Arg Val Phe Val Thr Asn Ala Leu Arg Ala Leu Lys Tyr Val Ser  
530 535 540

Pro Thr Gly Asn Ile Arg Asp Ile Pro Phe Val Val Ile Val Gly Gly  
545 550 555 560

Ser Ala Leu Asp Phe Glu Ile Pro Gln Leu Val Thr Asp Glu Leu Ala  
565 570 575

His Phe Asn Leu Val Ala Gly Arg Gly Asn Val Arg Gly Val Glu Gly  
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Pro Arg Asn Ala Val Ala Thr Gly Leu Ile Leu Arg Tyr Gly Glu Glu  
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Arg Arg Lys Arg Tyr Glu Gln Arg  
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<211> 1851  
<212> DNA  
<213> Lactobacillus reuteri

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<210> 21

<211> 615

<212> PRT

<213> Lactobacillus reuteri

<400> 21

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Gly Ser Gly Ile Ala Pro Thr Thr Gly Ile Lys Gly Thr Lys Gln Asn		
35	40	45

Leu Val Gly Ile Arg Asp Ser Ile Asn Gln Val Leu Asn Lys Ala Asn		
50	55	60

Leu Thr Ile Asn Asp Ile Asp Leu Ile Arg Ile Asn Glu Ala Thr Pro			
65	70	75	80

Val Ile Gly Asp Val Ala Met Glu Thr Ile Thr Glu Thr Val Val Thr		
85	90	95

Glu Ser Thr Met Ile Gly His Asn Pro Asp Thr Pro Gly Gly Ile Gly

100

105

110

Thr Gly Ala Gly Ile Thr Val Arg Leu Leu Asp Leu Val Lys Lys Thr  
115 120 125

Asp Lys Ser Gin Asn Tyr Ile Val Val Val Pro Lys Asp Ile Asp Phe  
130 135 140

Glu Asp Val Ala Lys Leu Ile Asn Ala Tyr Val Ala Ser Gly Tyr Lys  
145 150 155 160

Ile Thr Ala Ala Ile Leu Lys Asn Asp Asp Gly Val Leu Val Asp Asn  
165 170 175

Arg Leu Asn Lys Pro Ile Pro Ile Val Asp Glu Val Ala Met Ile Asp  
180 185 190

Lys Val Pro Leu Asn Met Leu Ala Ala Val Glu Val Ala Gly Ser Gly  
195 200 205

Gln Val Ile Ser Gln Leu Ser Asn Pro Tyr Gly Ile Ala Thr Leu Phe  
210 215 220

Gly Leu Asn Pro Glu Glu Thr Lys Asn Ile Val Pro Val Ser Arg Ala  
225 230 235 240

Leu Ile Gly Asn Arg Ser Ala Val Val Ile Lys Thr Pro Ala Gly Asp  
245 250 255

Val Lys Ala Arg Val Ile Pro Ala Gly Asn Ile Ile Ile Asn Ser Asp  
260 265 270

Thr Gly Lys Glu Glu Val Gly Val Ser Glu Gly Ala Asp Ala Ile Met  
275 280 285

Lys Lys Val Ser Ser Phe Arg His Ile Asn Asp Ile Thr Gly Glu Ser  
290 295 300

Gly Thr Asn Val Gly Gly Met Leu Glu Asn Val Arg Gln Thr Met Ala  
305 310 315 320

Asp Leu Thr Gly Lys Asn Ser Glu Ile Ala Ile Gln Asp Leu Leu  
325 330 335

Ala Val Asp Thr Gln Val Pro Val Glu Val Arg Gly Gly Leu Ala Gly  
340 345 350

Glu Phe Ser Asn Glu Ser Ala Val Gly Ile Ala Ala Met Val Lys Ser  
355 360 365

Asp His Leu Gln Met Glu Val Ile Ala Lys Leu Ile Glu Asp Glu Phe  
370 375 380

His Thr Lys Val Glu Ile Gly Gly Ala Glu Val Glu Ser Ala Ile Arg  
385 390 395 400

Gly Ala Leu Thr Thr Pro Gly Thr Asp Lys Pro Ile Ala Ile Leu Asp  
405 410 415

Leu Gly Ala Gly Ser Thr Asp Ala Ser Ile Ile Asn Lys Glu Asn Gln  
420 425 430

Thr Val Ala Ile His Leu Ala Gly Ala Gly Asp Met Val Thr Met Ile  
435 440 445

Ile Asn Ser Glu Leu Gly Leu Asn Asp Ile His Leu Ala Glu Asp Ile  
450 455 460

Lys Arg Tyr Pro Leu Ala Lys Val Glu Asn Leu Phe Gln Ile Arg His  
465 470 475 480

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Glu Asp Gly Ser Val Gln Phe Phe Glu Asp Pro Leu Pro Ser Ser Leu  
485 490 495

Phe Ala Arg Val Val Val Ile Lys Pro Asp Gly Tyr Glu Pro Val Thr

500

505

510

Gly Asn Pro Ser Ile Glu Lys Ile Lys Leu Val Arg Gln Ser Ala Lys

515

520

525

Lys Arg Val Phe Val Thr Asn Ala Leu Arg Ala Leu Lys Tyr Val Ser

530

535

540

Pro Thr Gly Asn Ile Arg Asp Ile Pro Phe Val Val Ile Val Gly Gly

545

550

555

560

Ser Ala Leu Asp Phe Glu Ile Pro Gln Leu Val Thr Asp Glu Leu Ala

565

570

575

His Phe Asn Leu Val Ala Gly Arg Gly Asn Val Arg Gly Val Glu Gly

580

585

590

Pro Arg Asn Ala Val Ala Thr Gly Leu Ile Leu Arg Tyr Gly Glu Glu

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600

605

Arg Arg Lys Gln Tyr Glu Gln

610

615

<210> 22

<211> 1848

<212> DNA

<213> Lactobacillus reuteri

<400> 22

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aataaggcta attaacgat taatgatatt gatttaattc ggattaatga ggcaacgcca 240

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ggtagttgtcg cgatggtaa gtctgtatcat cttccaaatgg aagtaattgc taaattaatt	1260
tcaacagatg cttcaattat caataaagaa aatcaaactg tagcaattca ctttagctgtt	1320
gctggtgaca tggttacgt gattattaac tctgaattgg gattaaatga cattcactt	1380
gcagaggata ttaagcgcta tccattagct aaagtcgaaa atctattcca aattcgcat	1440
gaagatggat cggtaacatt ctttgaagat ccgcctccgt catcattatt tgctcggtt	1500
gttggtaatca aaccagatgg gtttgcattt gtttgcattt atccaaatgc tgagaagatc	1560
aagctggttc gtcaaagtgc taagaagccg gtatttgcattt ccaatgcatt acgagcttt	1620
aagtacgtca gcccgcacagg aaacattcgt gatattccgt ttgttgcattt tgctcggtt	1680
tctgctcttgc actttgcattt accacaactg gtaacagatg agttgcaca ctttgcattt	1740
gttggccggac gtggaaatgt tcgtggatgtt gtttgcattt gtttgcattt tgcaacagga	1800
ttaattctcc gttatggcga agaaagaaga aagcaatgt aacaatgt	1848

<210> 23  
<211> 119  
<212> PRT  
<213> Lactobacillus reuteri

<400> 23

Met Asn Asn Asp Asp Ser Gln Arg Pro Ser Ile Val Val Gly Leu Glu  
1 5 10 15

Asn Gly Ile Thr Ile Pro Asp Ser Val Lys Pro Leu Phe Tyr Gly Ile  
20 25 30

Glu Glu Glu Gln Ile Pro Val Ser Val Arg Lys Ile Asn Ile Asn Asp  
35 40 45

Thr Val Glu Arg Ala Tyr Gln Ser Ala Leu Ala Ser Arg Leu Ser Val  
50 55 60

Gly Ile Ala Phe Glu Gly Asp His Phe Ile Val His Tyr Lys Asn Leu  
65 70 75 80

Lys Glu Asn Gln Pro Leu Phe Asp Met Thr Ile Asn Asp Lys Lys Gln  
85 90 95

Leu Arg Ile Leu Gly Ala Asn Ala Ala Arg Leu Val Lys Gly Ile Pro  
100 105 110

Phe Lys Glu Met Ala Asn Arg  
115

<210> 24  
<211> 360  
<212> DNA  
<213> Lactobacillus reuteri

<400> 24

atgaacaacg atgattcaca acgtccctcg attgtcgctcg gactagaaaa tggataacg 60

attccagata gtgtcaagcc actttttat ggaattgaag aagaacagat cccagtctca 120

gttcgtaaaa tcaatataaa tgatactgtt gaaagagcat accaatcgc tcttgcata 180

aggctatctg taggaattgc ttttgaagga gatcattta ttgttcacta taagaactta 240  
aaagaaaaatc agcctttatt tgatatgaca atcaatgata aaaagcaatt acgaattta 300  
ggagcaaatg cagcgagatt agtaaaagga atcccttttta aggaaatggc aaacaggta 360

<210> 25  
<211> 118  
<212> PRT  
<213> *Lactobacillus reuteri*

<400> 25

Met Asn Asn Asp Ser Glu Arg Pro Ser Ile Ile Val Gly Val Glu Asn  
1 5 10 15

Gly Thr Ala Ile Pro Gin Asn Ala Ala Pro Leu Phe Asn Gly Ile Glu  
20 25 30

Glu Glu Gin Ile Pro Val Ala Val Arg Glu Ile Asp Ile Asp Asn Val  
35 40 45

Leu Ser Arg Ala Tyr Gin Ser Ala Leu Ala Ser Arg Leu Ser Val Gly  
50 55 60

Ile Ala Phe Asp Gly Asp Arg Phe Ile Val His Tyr Lys Asn Leu Lys  
65 70 75 80

Glu Asn Lys Pro Leu Phe Asp Lys Thr Ile Ser Asp Gly Lys Gin Leu  
85 90 95

Arg Val Leu Gly Ala Asn Ala Ala Arg Leu Val Lys Gly Ile Pro Phe  
100 105 110

Lys Glu Met Val Asn Arg  
115

<210> 26  
<211> 357  
<212> DNA

<213> *Lactobacillus reuteri*

<400> 26

atgaacaatg attcagagcg tccctcaatt atcgtaggtg ttgagaatgg aacagctatt 60  
cctcaaaatg cagcaccgct ttttaacgga attgaagaag aacaaatacc ggtggcggtt 120  
agagaaaatcg acattgataa tgtttaagt cggcatacc agtcggccct cgccctcacga 180  
ttatcagtag ggattgctt tcatggtgat cgatttatcg ttcactataa aaacttaaaa 240  
gaaaacaaac cactatttga taaaacaatt agtcatggta agcaactacg agttctagga 300  
gcaaatgcag cgcgactagt aaaggaaatc cccttaagg aaatggtaaa caggtga 357

<210> 27

<211> 37

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 27

atgaaacgtc aaaaacgatt tgaagaacta gaaaaac 37

<210> 28

<211> 32

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 28

ttagttatcg cccttagct tcttacgact tt 32

<210> 29

<211> 30

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 29

atgaaacgtc aaaaacgttt tgaagaacta 30

<210> 30  
<211> 25  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 30  
ctagttatca cccttgagct tcttt

25

<210> 31  
<211> 29  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 31  
atgggaggca taattccaat ggaaaaata

29

<210> 32  
<211> 31  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 32  
ttaacgaatt attgcttcgt aaaccatctt c

31

<210> 33  
<211> 21  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 33  
atgggaggca taatgccat g

21

<210> 34  
<211> 31  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 34  
ttaacgaatt attgcttcgt aatcatctt c

31

<210> 35  
<211> 32  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 35  
atgaatagac aatttgattt cttaatgcca ag

32

<210> 36  
<211> 26  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 36  
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26

<210> 37  
<211> 33  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 37  
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33

<210> 38  
<211> 31

<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 38  
tcacctgttt gccatttcct taaaaggat t

31

<210> 39  
<211> 28  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 39  
atggcaactg aaaaagtaat tggtgtt

28

<210> 40  
<211> 26  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 40  
tcacctgttt accatttcct taaagg

26

<210> 41  
<211> 477  
<212> PRT  
<213> Lactobacillus reuteri

<400> 41

Met Gin Ile Asn Asp Ile Glu Ser Ala Val Arg Lys Ile Leu Ala Glu  
1 5 10 15

Glu Leu Asp Asn Ala Ser Ser Ser Ala Asn Val Ala Ala Thr Thr  
20 25 30

Asp Asn Gly His Arg Gly Ile Phe Thr Asn Val Asn Asp Ala Ile Ala

35                    40                    45

Ala Ala Lys Ala Ala Gln Glu Ile Tyr Arg Asp Lys Pro Ile Ala Val  
50                    55                    60

Arg Gln Gln Val Ile Asp Ala Ile Lys Glu Gly Phe Arg Pro Tyr Ile  
65                    70                    75                    80

Glu Lys Met Ala Lys Asp Ile Lys Glu Glu Thr Gly Met Gly Thr Val  
85                    90                    95

Glu Ala Lys Ile Ala Lys Leu Asn Asn Ala Leu Tyr Asn Thr Pro Gly  
100                    105                    110

Pro Glu Ile Leu Glu Pro Val Val Glu Asn Gly Asp Gly Gly Met Val  
115                    120                    125

Met Tyr Glu Arg Leu Pro Tyr Gly Val Ile Gly Ala Val Gly Pro Ser  
130                    135                    140

Thr Asn Pro Ser Glu Thr Val Ile Ala Asn Ala Ile Met Met Leu Ala  
145                    150                    155                    160

Gly Gly Asn Thr Leu Tyr Phe Gly Ala His Pro Gly Ala Lys Asn Val  
165                    170                    175

Thr Arg Trp Thr Ile Glu Lys Met Asn Asp Phe Ile Ala Asp Ala Thr  
180                    185                    190

Gly Leu His Asn Leu Val Val Ser Ile Glu Thr Pro Thr Ile Glu Ser  
195                    200                    205

Val Gln Gln Met Met Lys His Pro Asp Ile Ala Met Leu Ala Val Thr  
210                    215                    220

Gly Gly Pro Ala Val Val His Gln Ala Met Thr Ser Gly Lys Lys Ala  
225                    230                    235                    240

Val Gly Ala Gly Pro Gly Asn Pro Pro Ala Met Val Asp Ala Thr Ala  
245 250 255

Asp Ile Asp Leu Ala Ala His Asn Ile Ile Thr Ser Ala Ser Phe Asp  
260 265 270

Asn Asp Ile Leu Cys Thr Ala Glu Lys Glu Val Val Ala Glu Ser Ser  
275 280 285

Ile Lys Asp Glu Leu Ile Arg Lys Met Gln Asp Glu Gly Ala Phe Val  
290 295 300

Val Asn Arg Glu Gln Ala Asp Lys Leu Ala Asp Met Cys Ile Gln Glu  
305 310 315 320

Asn Gly Ala Pro Asp Arg Lys Phe Val Gly Lys Asp Ala Thr Tyr Ile  
325 330 335

Leu Asp Gln Ala Asn Ile Pro Tyr Thr Gly His Pro Val Glu Ile Ile  
340 345 350

Cys Glu Leu Pro Lys Glu His Pro Leu Val Met Thr Glu Met Leu Met  
355 360 365

Pro Ile Leu Pro Val Val Ser Cys Pro Thr Phe Asp Asp Val Leu Lys  
370 375 380

Thr Ala Val Glu Val Glu Lys Gly Asn His His Thr Ala Thr Ile His  
385 390 395 400

Ser Asn Asn Leu Lys His Ile Asn Asn Ala Ala His Arg Met Gln Cys  
405 410 415

Ser Ile Phe Val Val Asn Gly Pro Ser Tyr Val Gly Thr Gly Val Ala  
420 425 430

Asp Asn Gly Ala His Ser Gly Ala Ser Ala Leu Thr Ile Ala Thr Pro

435

440

445

Thr Gly Glu Gly Thr Cys Thr Ala Arg Thr Phe Thr Arg Arg Val Arg

450

455

460

Leu Asn Ser Pro Gln Gly Phe Ser Val Arg Asn Trp Tyr

465

470

475

&lt;210&gt; 42

&lt;211&gt; 1434

&lt;212&gt; DNA

&lt;213&gt; Lactobacillus reuteri

&lt;400&gt; 42

atgcagatta atgatattga aagtgcgtga cgcaaaattc ttgccgaaga actagataat	60
gccagctctt caagtgcaaa cgttgcagct actactgata atggcatcg cgaaatttc	120
actaatgtca atgatgcaat tgctgctgca aaagctgctc aagaaatata tcgggataag	180
ccaaattgctg ttgcacaaca agtgcattgtat gccattaaagg aaggattccg cccatatatt	240
gaaaaaatgg ctaaagatata caaagaagaa acaggaatgg gaacagttaga ggccaaaatt	300
gctaagttaa acaatgcctt gtacaacact cctggtcccg agattcttga accagttgtat	360
gaaaacggtg acgggtggat gttatgtat gaacggttac catatggtgtattggtgcg	420
gttggcccaa gtacaaaccc ttcaagaaact gtaattgcta atgcgtatcat gatgcttgc	480
ggtgttaata ctcttactt tggtgctcac cctggcgcaa agaatgttac tcgctggaca	540
attgaaaaga tgaacgattt tattgcagat gcaacaggcc ttcataattt agttgttaat	600
attgaaacac caacaattga atcagttcaa caaatgtga agcaccccgaa cattgcaatg	660
tttagcagtaa ctggggccc agctgttggtt caccaagcaa tgaccagtgg taagaaagcg	720
gttgtgtcg gtcctggtaa tcctcctgca atgggtgtatg ctactgctga tattgattta	780
gctgctcata atatcattac atctgcttca tttgataatg atatttatg tactgctgaa	840
aaggaagtag ttgcagaaag tagcattaaa gatgaattaa ttgcgtaaat gcaagatgaa	900
gggcctttg tagttaaccg tgaacaagcc gataaattag ctgatatgtg tatccaagaa	960
aatggtgctc ctgatgtaa atttgggtt aaggatgcaa cttatatctt agaccaagct	1020

aatattcctt acacaggcca cccagttcaa attatttgcg aacttcctaa ggaacatcca	1080
ttagtaatga ctgaaatgtt aatgccaatt ttaccagttg tttcttgc aacattgtat	1140
gatgttttga agactgctgt tgaagttgaa aaaggttaacc atcacacagc tactattcat	1200
tccaaataacc ttaagcatat taataatgct gtcaccgga tgcaatgttc aatcttgc	1260
gttaatggcc catcctatgt tggtacaggt gttgcagata atggagctca ctcaggtgt	1320
tcagcattaa caattgctac gccaactggt gaaggaacat gtactgcacg aacatttact	1380
cgtcgggttc gtttgaactc accacaagga ttctcagttac gtaactggta ttaa	1434

<210> 43

<211> 395

<212> PRT

<213> Lactobacillus reuteri

<400> 43

Met Met Ser Lys Lys Ile Leu Ala Ile Asn Ser Gly Ser Ser Ser Ile			
1	5	10	15

Lys Phe Lys Leu Tyr Leu Met Pro Glu Glu Lys Leu Leu Ile Ser Gly		
20	25	30

Ser Ala Glu Asn Leu Gly Ser Ser Thr Ser Gln Leu Ser Tyr Lys Thr		
35	40	45

Asp Lys Thr Asn Glu Thr Arg Gln Ile Pro Leu Lys Asn His Ser Glu		
50	55	60

Ala Ile Asp His Ile Ile Asp Val Leu Met Ser Ser Gly Val Val Lys			
65	70	75	80

Asp Lys Ser Glu Ile Tyr Gly Val Gly His Arg Ile Ser His Gly Gly		
85	90	95

Ser Tyr Tyr Thr His Ala Val Ala Val Thr Pro Glu Val Glu Lys Arg		
100	105	110

Ile Asp Glu Leu Lys Val Leu Ser Pro Leu His Asn Pro Asn Gly Leu  
115 120 125

Ala Gly Ile Lys Ala Phe Glu Lys Phe Leu Pro Asp Ala Lys Glu Val  
130 135 140

Val Thr Phe Asp Asn Ser Phe His His Thr Ile Pro Lys Lys Ala Tyr  
145 150 155 160

Met Tyr Ala Leu Pro Tyr Glu Phe Tyr Glu Lys Tyr Gln Ile Arg Arg  
165 170 175

Tyr Gly Phe His Ala Pro Ser His Gln Tyr Val Ser Glu Lys Ala Arg  
180 185 190

Glu Leu Phe Gly Lys Glu Lys Thr Arg Arg Met Ile Thr Cys His Leu  
195 200 205

Gly Asn Gly Ser Ser Val Ser Ala Ile Leu Asp Gly Lys Ser Val Asn  
210 215 220

Ser Ser Met Gly Phe Thr Pro Leu Ala Gly Val Val Met Gly Thr Arg  
225 230 235 240

Cys Gly Asp Ile Asp Pro Glu Ile Ile Pro Phe Leu Glu Glu Leu  
245 250 255

Asn Ile Asp Ser His Glu Met Arg Arg Ile Met Asn Glu Asp Ser Gly  
260 265 270

Leu Lys Gly Leu Ser Gly Ile Ser Asn Asp Glu Arg Glu Ile Glu Ser  
275 280 285

Ala Ala Lys Asn Gly Asn Glu Arg Ala Gln Leu Ala Leu Asp Val Phe  
290 295 300

Val His Ser Ile Gln Gln Tyr Ile Gly Ala Tyr Thr Thr Asp Leu Asp

305

310

315

320

Gly Leu Asp Thr Leu Val Phe Thr Ala Gly Ile Gly Glu His Ala Ala  
325 330 335

Tyr Ile Arg Ser Gln Ile Cys Lys Asn Leu Asp Tyr Leu Gly Val Lys  
340 345 350

Ile Asp Glu Glu Lys Asn Lys Asn Asn Glu Leu Ser Ile Glu Ala Pro  
355 360 365

Asp Ser Lys Val Lys Ile Ala Val Ile Pro Thr Asn Glu Glu Ile Ile  
370 375 380

Ile Ala Arg Asp Val Met Asn Val Thr Gln Gln  
385 390 395

<210> 44

<211> 1188

<212> DNA

<213> Lactobacillus reuteri

<400> 44

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acaagtgc	tttcatataa	aactgataaa	actaacgaga	caagacaaat	ccctttaaaa	180
aaccactcag	aggcaattga	ccatattatt	gatgtttaa	tgtctagtgg	ggttgttaag	240
gataagtcc	aaatttatgg	tgttggtcac	cggatttc	atggcggaaag	ttactatact	300
catgcagtgg	cagtcactcc	agaagttgaa	aaacggattt	atgaattgaa	ggtgttatca	360
cctctgcata	atccaaatgg	actagcaggg	ataaaagcct	ttgaaaagtt	tcttccagat	420
gccaaggaag	tagttacttt	cgataattca	tttcatcata	caatccctaa	gaaagcttat	480
atgtatgctt	tgccatatga	gttttatgaa	aagtatcaa	ttaggcgcta	cgggttccat	540
gcccccac	atcagttatgt	gtcagaaaaa	gccccgtgaac	tttttggtaa	agaaaagact	600
cgtcgatga	tcacgtgtca	tttggaaat	ggatcaagcg	tttcggcgat	cttagatgga	660

aagtccgtta actttcaat gggcttact cgcttagcag gtgttagtgcat gggAACGCGA	720
tgtggagata ttgatccaga aattattcct tttcttgaag aagaactcaa tattgattca	780
catgaaatgc gtcgaataat gaatgaagac tcagggctta aaggcttac tggttct	840
aatgtgaac gtgagattga aagtgcggct aaaaacggta acgaacggc acaattagct	900
tttagatgtat ttgtacattc aattcaacaa tatattggag catatacaac ggatcttgat	960
ggattggata cattagtatt tacagccgga attgggtgaaat atgctgctta tattagaagt	1020
cagatctgta agaattttaga ctatcttggaa gtcaaaatttgc acgaagagaa aaataaaaat	1080
aatgagctaa gcatttgaagc acctgtatgt aaggttaaaa tagctgttat tccaaactaac	1140
gaagaaataa ttattgccccg tgatgtatgt aatgtaaatc agcaataa	1188

<210> 45  
<211> 1122  
<212> DNA  
<213> *Lactobacillus reuteri*

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agtgataagt atcttaaaaaa cttggcaca aaaccgttat tattggctgg cgaaacagtc 120  
tataaaatig taggtaagcg ttttgaacag tatcttcaag aaagtggtaa tgatgtcacc 180  
cgtgttcaat ttaatggtga atcatccact aacgaagtaa accgggttac agaaattgg 240  
aaagaaaata atgtaactgt cgtttatggt ctgggtggtg gtaaaacagt tgataccgcc 300  
aaagcaattg ccgacaatct ccatctacca gttgttaattt tgccaaacatt ggcttcaa 360  
gatgcacctt gttctcgctc ttcaagtaatc tacactgatg acgggtggctt cgatcattat 420  
cgtttctaca accaaaaaccc taatctggtt ttagttgata ctcaagttat cgctaattgg 480  
cccggttcgga tgcttatttc tggaatttgct gatgctttag ctaccaatgt tgagggcacaa 540  
gcagttgctc aagctcatag tgataacaatg ctgggtgaaa aacaaaccct tggtaatgg 600  
gcaatcgccc agaaatgtga agagacatta tttaattact cgcacctagc tggtaatgg 660  
gcagaaaccc atgtcgttac accagcattt tctaataattt tggtaagcaaa tacactaatg 720

agcggtctcg	gttttcaaag	tggggctca	tctgggccc	acgctattca	tgtatggctta	780
acaattttag	aagagactca	tgatttaaca	cacggtaaa	aggtcgata	cggtagctta	840
acacaattaa	tgttggagg	cgctgaccag	gaacgctata	acaagttactt	ccaattttt	900
ctttcttttag	gcctaccaac	tactcttgc	gatctacatt	tagaaaatgt	caccgatgaa	960
gaactgctca	atgctggaaa	agccgcgtgt	tcagaacaag	ataccatgga	tcgtttgcca	1020
tttaaggtaa	ctccagatga	cgttgctcaa	gcattacgag	cagttgatgc	atatactaaa	1080
caatatttaa	ctaatcatcg	ttgtcaccat	agtctgtatgt	aa		1122

<210> 46  
 <211> 1021  
 <212> DNA  
 <213> Artificial

<220>  
 <223> recombinant DNA

<400> 46						
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aatggcggaa	acgtaaaaga	agttatggaa	ataagactta	gaagcaaact	taagagtgt	120
ttgatagtgc	agtatcttaa	aattttgtat	aataggaatt	gaagttaaat	tagatgctaa	180
aaatttgtaa	ttaagaagga	gtgattacat	gaacaaaaat	ataaaatatt	ctcaaaactt	240
tttaacgagt	gaaaaagtac	tcaaccaat	aataaaacaa	ttgaatttaa	aagaaaccga	300
taccgtttac	gaaattggaa	caggtaaagg	gcatttaacg	acgaaactgg	ctaaaataag	360
taaacaggtt	acgtctattt	aatttagacag	tcatctattt	aacttatcgt	cagaaaaatt	420
aaaactgaat	actcgtgtca	cttaattca	ccaagatatt	ctacagttt	aattccctaa	480
caaacagagg	tataaaattt	ttgggagtt	tccttaccat	ttaagcacac	aaatttattaa	540
aaaagtggtt	tttggaaagcc	atgcgtctga	catctatctg	attgttgaag	aaggattcta	600
caagcgtacc	ttggatattt	accgaacact	agggttgctc	ttgcacactc	aagtctcgat	660
tcagcaattt	cttaagctgc	cagcgaaatg	ctttcatcct	aaacccaaag	taaacagtgt	720
cttaataaaaa	cttacccgcc	ataccacaga	tgttccagat	aaatatttgg	agctatatac	780

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tcatcaagca atgaaacacg ccaaagtaaa caatccaatg accgttactt atgagcaagt 900  
attgtctatt tttatagtt atctattatt taacggagg aaataattct atgagtgcgt 960  
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t 1021

<210> 47  
<211> 30  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 47  
atgcagatta atgatattga aagtgcgt 30

<210> 48  
<211> 27  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 48  
ttaataccag ttacgtactg agaatcc 27

<210> 49  
<211> 34  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 49  
ttgatgtcaa aaaaaatact tgcaattaat tctg 34

<210> 50  
<211> 29  
<212> DNA

<213> Artificial

<220>

<223> primer

<400> 50

ttattgctga gttacattca ttacatcac

29

<210> 51

<211> 23

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 51

atgggtgaag aatttggctc acc

23

<210> 52

<211> 24

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 52

ttacatacga ctatggtgac aacg

24

<210> 53

<211> 19860

<212> DNA

<213> Lactobacillus reuteri

<400> 53

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aatataaaaa ggttgggttt tagacatgca tggattttt ggcgaatttt ttggcaccat 180

ggttttaatc ctattaggag caggatgtt gtcgttaat agtttgaata aaacatatgg 240

gaaacaaagt ggctgggtt ttatctgtat ttcatgggc ttagcagtta caatggagt 300

ttatgttgcg ggatttctgg gttcattagg gcacttaat cccgctgtaa caattccctt 360

tgctatTTT ggcttattcc catggagtaa cgTTatacct tacttacttg gtcaatttct	420
tggTgcTTT gttggTgcag tattAGtaat tattcaattc tatccacaat ttAAAGcaac	480
cccaaaatgaa gaagaaggaa ataATgtgg tattttgct actogtccag ogataaATag	540
tccaatTTT aactTTTct cagaAGtGat TgcGacCTT gcatttattt tcATcttatt	600
aaATcttggc aactttacac agggattgaa gCcatttATC gtaggaatgg ttattgcagt	660
tgttggTaca tgtctcgGGA caactactgg cttTgcattt aaccCAGctc gtgattggc	720
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gaatattgtat gggacttcat tcaaaaatcc caataatcta agtatttagta agatccaatt 18540  
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aaacaactat atcagcatcc atcgaggta cacgtaacgt gctcatcata ttatgtatgc 19440  
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ctccgataaa catagttcgt ttctataattt aatacccttca ccaattctac aaaaatatac 19620  
tattttatctg tattataataa aagcggtaa cacatagcca tagataaaaaa aagatttagt 19680  
aggaattata gatgctaaca gcacatgttag tttatgccac gatgactggt aataatgagg 19740  
aagtagcaaa cattgtatgt gatagtttga ctaattttaa tttttaaatgtt acagagtctg 19800  
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<210> 54  
<211> 708  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 54  
atgcatggat ttattggcga atttttggc accatggttt taatcctatt aggagcagga 60  
tgttgtgctg gtaatagttt gaataaaaca tatggaaac aaagtggctg gtggtttac 120  
tgtatccat ggggcttagc agttacaatg ggagtttatg ttgcaggatt tctgggttca 180  
ttagggcact taaatccgc tgtaacaatt cctttgcta ttttggctt attccatgg 240  
agtaacgtta taccttactt acttggtcaa tttcttggtg cgtttggtgg tgcagtatta 300  
gtaattattc aattctatcc acaatttaaa gcaaccccaa atgaagaaga aggaataat 360  
gttggtattt ttgctactcg tccagcgata aatagtccaa ttttaactt tttctcagaa 420  
gtgattgcga ccttgcatt tatttcatc ttattaaatc ttggcaactt tacacaggga 480  
ttgaagccat ttatcgtagg aatggttatt gcagttgttgc tcatatgtct cgggacaact 540  
actggctttg cattaaaccc agctcgatgat tggtcaccac gtttagcata tactatttg 600  
ccaattccta ataagggtgt ttcagaatgg tggatgcat gggttccaat gtgtggccca 660  
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<210> 55  
<211> 834  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 55  
atgaaaaaag aattttaaa aagtagtaat gaacaattaa aaaaatttc cgagatttt 60  
aatggggata agcctttacg taaagttacg gctgtgaaa agctaaaggt cggtagat 120  
ttaggaactt cttcaattgt tttaacagtgc ctggattcca aagataagat tgtatacgga 180  
gcgtatgaat atgaccatgc agttcaagat ggtattgttag ttaatttcattt ggaatcgtt 240  
aatattttaa gacgcttaaa agaaaaagct gagaaagtat taggacgtga acttaaaacg 300  
gcatgtggtg ctattccacc gaagacagga gagaagagtgc ccaaagtggc tgctaatgtt 360

atcgaagaga caggcttgot ttgtacaggt gttgaagatg aaccgacagc agctgcgaag	420
ttcttaagat tgtcaaattgg tacagttgt aatgttggag gaggacaac tgggattagt	480
atttttaag ataacaagot catccatgtt attgtatgtt aacacaggcgg atttcataatg	540
acgcttggc ttggaggaag atataaaata aaaaatgtt aagcagaaaa attaaagcgt	600
aacaagaata aagaatctgtt agtataatgtt gttttaaaac ctgtatgtt gaaaatggca	660
gcaattgttc aaaaatatggg agtagaaattt attgtatccatg taatgtt gggaggtgca	720
actaacttta ctgaattttac aacaacccat agttaaagattt taaagcgtt agtttataaa	780
ccgctttatc ctcaattttgt tacgccacta gggattgcaaa tgtttgcgtt ttag	834

<210> 56  
 <211> 1080  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 56	
atgtacgaat attcttcaaa attcttgaat gacattcaaa aggttacaaa aacatttcag	60
gaaataacca ataataatataat aattttccatc agcatttccatc gagcaatttgt tgattgcaac	120
acccttcttt ttgactcaaa tatttcaattt gacatatttac gaaaactcga tttttttttt	180
tactttgttt ttccactagt tataagctca tcttttgcgtt gtttctttgt tcttgcgtt	240
tcacatataatg aatcagacgc tatttgcgtt tttttttttt atattttttttt ttcttgcgtt	300
aatttttttt acagttccaa tgactgcata gctgtcctt ccccatcgtt ggcttcgtt	360
ctaaatccatc taatcaatgtt cttttttttt tttttttttt ttcttgcgtt tgatttgcgtt	420
gctttttttt ctaatccatc tattttttttt aacagaaatg atggatctt aatgtatgtt	480
gaaaaaaaata taaccatggc gctttttttt attaattccatc attttttttt atcgcttact	540
ttttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt	600
aattttttttt atgacaatttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt	660
gaaaaaaaataa tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt	720
cagacaagttt actttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt	780

cgaaaatata attccgcaat aaagaaaatc tatactattc caagagattt acaatggcgc	840
tcaaataagt ccgttatga aatctcaaaa gatttttca ataaaaatga tatttcctt	900
aaagcccggt atttaaatgg gtatccatat atctattcaa taaatgatct gaatgatgtt	960
agtaataaag caggttgggt ctatacagta gattgttctc aacctattat tccagctgt	1020
gagattaatg tatttgatcg ttcagtaatt caatggattt atactgaaaa aattatttaa	1080

<210> 57  
 <211> 282  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 57	
atgggacaag aagcacttgg ttttaattgaa accgaaggac ttgttagcttc aattgaagct	60
gctgatgcaa tggtaaaagc tgctaatgtt aaattaattg gtcaagaaaa gattggtcat	120
ggattagtca cagtaatggc tcgtggtgat gttggagctg ttaaggcttc agttgatgcc	180
ggagtacaag ctgcccggaaaa tattggagaa gttgtttcga gttacgtaat tcctcgccct	240
caatctgaag ttgataagct cttaccgcat catggagaat aa	282

<210> 58  
 <211> 717  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 58	
atgaatgatt ttctgaattt tactagtact gttccagaat ttgttgtgc tagcgaaatt	60
ggagatacca ttggaatggt aattccgaga gttgatcaac aactattaga taaattacac	120
gttacaaaac aatacaagac ttttaggtatt ttgagtgtac gtactggtgc tggtccacaa	180
attatggcaa tggatgaagg aattaaggct actaacatgg aatgtattga tttgttatgg	240
ccacgtata ctaaagggtgg aggaggccat ggtatgtttaa ttatcatcg tggtgatgt	300
cctgcagatg cacgccaagc tattcgggtt gcacttgata atcttcatcg tacatttgtt	360
gacgtttata acgccaaagc gggtcacctt gaattacaat ttacagctcg tgctgcagg	420
gctgcacatc ttggatttagg tgcagttgaa gggaaagcat ttgggttgat ttgtggttgt	480

ccttcggga ttggtgtcgt gatggagat aaggcttaa agactgctgg tggtaaccg 540  
cttaactta cttcaccaag tcatggtaca agttctcta acgaagggtg ccttaactatt 600  
accggtgact caggagctgt tcgtcaagct gttatggctg gacgtgaagt aggattaaag 660  
ttattgtcac agtttgtga agaaccagtt aatgatttcc catcatacat taagtag 717

<210> 59  
<211> 570  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 59  
atgaagtctt tggctatgt agaatgtaat ggattatctg gcgttattgt ggctgctgac 60  
aggatgctaa aaactgcaga tggtaactt agtagtattc aaaatacgaa aggtatgga 120  
tggtcacct tacaagtttc tggtaacta tcagctataa ctgttgcgtt tcaagctgt 180  
aaagactatt tacctgatgt atatgtaacg tcagcgataa tagggcgtcc agcaataggg 240  
ttgaactct tggcaaaac agatttattt caaccaaattc cagaaaagca gcaaaatatt 300  
gctgaaaagg aaaaggttgc tgaaccatct tcaattaaag aagagatgt acagaatagt 360  
gaaaattctg ctgaacctag tggtaactt gagcgatcat tagagggcaa agatgaaatc 420  
gaagcttcgg attcgtctaa tgataaaca gataccaact ctaatgataa tgaagtaca 480  
tgcaatatgt gtggagatcc aaaatgtcca cggaaattt gagaaccgca taagaagtgt 540  
atccattaca atgaattaaa gaaaaagtag 570

<210> 60  
<211> 291  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 60  
atgaataacg cttaggaat gattgaaaca cgcggattag ttgcatttat tgaagctgt 60  
gatcaaatgg taaaggctgc taatgtaca ttaactggcc aagaaaagat tggtagtgga 120  
ttggtaactg ttatgattcg tggtagtgg tggctgtaa aggctgcgt tggatgtgtt 180  
gtacaagctg ctgaagggtt cggcgaagtt gtatgtctt acgttaattcc tcgtccacat 240

gaagaagttg aaaagattt accaggtgga tcagattcag acgctgaata g 291

<210> 61  
<211> 645  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 61  
atggatgaag aacatthaag aacacttatac cggacgattg ttagagaaac acttaatcct 60  
aacctagttc caattggtgt ttcaaattcac catgtacatt tgacggaaga agactttcaa 120  
aagctattcc ctggtaaaaa gattgaaatg ctaaagaaac ttgcgtcaaca tgccgacttt 180  
gctgcaaagc aaactgttga tctgatcggg cccaaaggca ccattgaaca tgttcgctta 240  
atggggccat accgttcaca ctcacaggtt gaaattgccc gttcagaaaa cttaacacta 300  
ggaattgatg ctccaaattag aatgtctggt gatcttgcgt gcaccccttc aattaaggaa 360  
cggtcaccat atgcggaaat taaaattcaa ggtgttaattt tgccaaagcg acacatccac 420  
atagattttag aagatgccaa gcgcttggc gtaaagctcg gtgatcaat gcaggttggaa 480  
gtagatggcg atggggacg taaaaccatt tttgatgacg tagttgcgt ccctcgtaa 540  
gactttgtcc ttgaaatgca tattgatact gatgaagcca atgcagctaa tgtcggacta 600  
ggttaataatt ctttcgaaaa agtttattatc aagaagaaaa actaa 645

<210> 62  
<211> 504  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 62  
atggataacc tagtacaaca ggttatgcaa cgattagaag aacgaaagca tacgagcgaa 60  
gaagttactt ttaatcatca agttgccccg cctagtgaac agatttttt gagaaacggaa 120  
aaagttattt taaaagatat ttgcattttag ttaataacgg attatattt aatggaaaaag 180  
actaacgctt gggtaaatg ggttttagaa ggaatttagct atgatgtttaa attttacttt 240  
ttaattaatg aacagatggt taattttattt ccacggatga tgatttggaa ctggccgatc 300  
ttgtttgttg taaaataacga atcgccagta attgccagtt ataatcgat tattaccaga 360

gaagagatag ctgctaaacc agataaatcg attcttgtt aatatcaaaa gcaacatatt 420  
acagatgaag cacttgatat ctgtactat aaaaaaatta aaataaagat taggactgaa 480  
gaaaattgtt tatggcgaga gtag 504

<210> 63  
<211> 273  
<212> DNA  
<213> Lactobacillus reuteri

<400> 63  
atggcgagag tagtaggttag ttttgtgca acccaaagg atccatcctt agttggaaag 60  
aaactaatga tagttcaaca gattaattcc gaccaacaac cagttcgatt tgaacaagtt 120  
gccgctgata cagtaaatgc tgggattgggt gataatgtat taatagttcg tggtgctgg 180  
gcaagacgtg ctgataaaaga gcgtgtatgag gatcaagtaa gggacgttaa tgactgtacg 240  
atagttggaa taattgaccg ttttgataag tag 273

<210> 64  
<211> 609  
<212> DNA  
<213> Lactobacillus reuteri

<400> 64  
gtgtcattg gaggcatcaa aatggctatt tacacaaaag gtggtgacaa gggagaaaca 60  
agtttattcg atgaaacgag ggtacctaag gattcattac gagttgaaac ttatggaact 120  
tttgcataat taaacgctaa tattgtttg gcagataat tctgtgaaag taaacgtaat 180  
aagaagcttt tacaagagat cgaatataaa atgttttcc ttcaaggatgaa gatagcgaca 240  
gaaaaacggc agtattttac tgataaaaat aagatttta ctgtatgaa tactcgaaaa 300  
cttgcgggat tattgtatgaa atatacatca aaactgccac ctgttcatag ttttatctta 360  
cctgggttcga gtactgcggg tgcacaactt catatttgcgaa gacaaatctg tcgtcgtgca 420  
gagcgactat ttgtgcggct atcaagaat gtaaaaatttc gtccagagct agaaagatata 480  
atataatcgatg tgcggattt tttatataattt gtagcgcgtg atgaagacta tgaagatata 540  
ttaaatagtg taactgatgaa cgtgttaaaa atttacaaac gttatcaaga agaaaaggat 600

gtgcgttaa

609

<210> 65  
<211> 474  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 65  
atgaacgagg aacaaattag taagattgtt gaaaacgtaa tcaagaataa tgcttctaaa 60  
aatctatttg atcggcacaa aatggaaaaa gtaatcgatg cggctgttagc tcgtgctaat 120  
gaattgggtg ttggagtaac aattgctatt atgaaagctg atcaagtatt gcaaatgagc 180  
taccatatgc caaatgctaa tttagtaagt tgtactttag ctcctaaaaa ggcatggtca 240  
gcattagcaa tgaaggaacc taccaaggat attagtaagg atatccaacc aggtgccgga 300  
ttatataaaa tggaaacaat gcttgcgtt aagttgcatt cttttgcagg tggattccca 360  
ttgaagatta acgtgaaat tattggagcg attgggtta gtgggtgatt ggttgaagaa 420  
gatcaatcaa tttgtgaagc tgctgttgcga gaatttttga aggagagtaa gtag 474

<210> 66  
<211> 348  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 66  
atggctaggc aggatataa acggacaatt caagaatatg ttccggtaa acaggtaaca 60  
ttagcacata tcgttgctaa ccctacgcca gacatttatg agaaattagg gatacaaact 120  
cctaaaaatg cgcttggtat tttgacaata acgccaagtg aagcctcaat tatcgctgg 180  
gatattgcta caaagtgcgag taatgttact ctagggttca ttgatcgatt tagtggctcg 240  
gtttaattt tgggagaagt ttctgaaatt gaatcagctt tgcgtcatgt ggttgataag 300  
ctacaaacgt tactgggtt tgatgttccct gaaattacac gaacataa 348

<210> 67  
<211> 795  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 67  
atggcgaatc atcagcgaat tctagcggtt gaaaatggat ttaatttcg agatcttgtt 60  
ggttatagaa ctattgatgg cgaaagtctg aatggaata atcttgcgtt tcgtgcgtt 120  
ctctcctatt ttacacataa tgagcaaaga aaactttatg gatatggat taggacaatt 180  
attgacttgcgttcaacttc cgaagtagct ttatcccg accaattaac atcattgtt 240  
aattatatttgcgtt gataccgtt ctgttggaaat gacottactg aaagtaatat tagtattgtt 300  
gaagcactgaa aaagtttttc aaaggatcca caagcgggtt ttaatcgcat gatggaaatgtt 360  
tattgtcaat ttgtcactgtt tgagaaagca caagaagcat ttcacacccattt tattaaaaaa 420  
ttatgcctac attcagcgca ggggtgtt ttatccatt gctctgcggg gaaagaccgtt 480  
actggtttag gagcaatttttactaagt ctttactaag ttccagtaga tataattttt 540  
caagattata tttaactaa taaagcatca aaaaaagga aaaaagaacg attacgtt 600  
gctataaaaaa ataacctagg tgataattttt cttcactcaa ttacgtatct ttcaacagca 660  
aatagggttttattatgtca agcaatctctt ctttataata ataaatatgg tggaaatgacc 720  
tcttacttaa aagatgtgtt acaaatcgtt gattcaatgg ttgaacaact aagataactta 780  
tatctgacaa agtga 795

<210> 68  
<211> 321  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 68  
atgtattttgcgtt atgttggaaatc gaatgacgtt cgaccacattt caatttgtt aatcaaggc 60  
gaaaacttttgcgtt aacatgctcg tgcacgaata tggtcattttt tattggatctt ttcttataag 120  
tatccacaac aaaaatttt aataattaca catggcttggaa taataaaaaaa tatcatttcg 180  
ttgtgtcttgcgtt agaatattgtt tggacttca ttcaaaaatc ccaataatct aagtattgtt 240  
aagatccaaat tgaatccggc attaaagcag caacgaatat gttattataa tcgaccgttc 300  
atagggacga tggatattatgtt a 321

<210> 69

<211> 558  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 69  
atgagtctta ttacaattct tttgatattt gtgggactta atattgatac gtttattgca 60  
ctattatttc ttttacgaaa ctataattac cggttaccga ttattggctt tggagtagca 120  
acgcttattt tatggatctt tgggttaatt ttagaaaaag ggcttagcatt tctatttcca 180  
gattggatta caggatttat gggcattatt ttaatcttta tagcgcttt tgaacaggat 240  
gacgaaaaaa agacaactaa tacaagttt ctctcattac ttctgtttt ttaagcctt 300  
ggtggagata atcttgctgt ttatattcca ttgggttta accttagttt gagtcagatt 360  
atatacgtag gaataatttt taaaatttgt tcagtcctat taattctatt aggaaaacaa 420  
tttgcattaa taaaacctgt ggcattttt ttggaaaaat atggtaattt tggaagcaaa 480  
attgttatg ttttagcggg tttatattt atttgaata gtcatttaat taatcacctt 540  
attagaattt ttaattaa 558

<210> 70  
<211> 429  
<212> DNA  
<213> *Lactobacillus reuteri*

<400> 70  
atgaaacgaa ctatgttat cggagcaata gcatgtggta aaacaaccct tactcaacga 60  
tttagaaaaatc aacaaattaa atataataaa acacaagcaa ttgaatttc atcaaatatt 120  
attgacacac caggagaata tatggagcat cataatatga tgacgacgtt acgtgttaacc 180  
tcgatggatg ctgatatagt tggttattt caaagtgcgg ttgacaaacg acttgcattt 240  
ccggctggct tctgttcaat gtttcgaaa cctactttttag gtgttagttac aaagattgt 300  
cttgcattaaag accctgccga cattgaatat tccagaatc ttctgttaag cgctgggtt 360  
aagaaggtaa ttccgtttc ggcagttgaa aatattaata tcgataaaatt agttgctgaa 420  
cttaattaa 429

<210> 71

<211> 65  
 <212> DNA  
 <213> Artificial

<220>  
 <223> Synthetic DNA

<400> 71  
 atggaccgca ttattcaatc accggtaaa tacatccagg gcgctgatgt gattaatcgt 60  
 taacc 65

<210> 72  
 <211> 58  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

<400> 72  
 ctggcgaat acctgaagcc gctggcagaa cgctggtag tggggtaa caaattt 58

<210> 73  
 <211> 1257  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

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